

NEWS REPORT

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NATIONAL RESEARCH COUNCIL



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NEWS REPORT

National Academy of Sciences National Research Council

VOLUME XI

March-April 1961

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Scientific Manpower Research

LINDSEY R. HARMON

Director of Research, Office of Scientific Personnel

WHAT baccalaureate schools are the highest producers of scientists, in relation to the size of their student populations? This question, deceptively simple on first consideration, has been raised repeatedly by people interested in questions of scientific manpower. The complexities attendant upon it only become fully apparent when an attempt is made to obtain a concrete answer. It was basically this question which prompted the Office of Scientific Personnel (OSP) to undertake, in 1946, the compilation of data for the booklet "The Baccalaureate Origins of the Science Doctorates Awarded in the United States, 1936-1945" published in June, 1948. The Carnegie Corporation and the Office of Naval Research supported this first effort. Since that time, three additional books on the same general theme have been published, expanding the coverage both as to fields of doctorate and time span included. The most recent is NAS Publication 582, "Doctorate Production in United States Universities, 1936-1956, with Baccalaureate Origins of Doctorates in Sciences, Arts, and Humanities" published in 1958.

The first of these booklets was based upon data from 14,905 cases, the latest on 97,409 cases. Doctorate production has

climbed in the meantime to 9357 in 1959, with 1960 production estimated to be approximately 10,000. Over the past 80 years in the United States, doctorate production has increased at an average rate of 7% per annum—roughly doubling every decade. The science fields and other fields have grown at roughly the same rate over this period, one field or another gaining from time to time at a higher or lower rate which is dependent upon a multitude of factors, including the amount of support provided by government activities, such as fellowships and grants which include funds for assistantships. The original question has never been satisfactorily solved, but in the meantime many other questions have been raised and a number of them answered. The Doctorate Records file of the OSP, which is the basic reference source for a large and increasing number of studies, now includes about 135,000 names and will in the near future reach 150,000, including the names and degrees earned by all holders of doctorates granted by United States Universities from 1920 to the current date. This undertaking, supported originally by Carnegie and the Office of Naval Research funds, has enjoyed the support also of the Ford Foundation and the Na-

tional Science Foundation. The latter agency and the U. S. Office of Education currently share the cost of maintaining the basic file.

For the period up through 1956, the file contained only the information on the doctorate-holder's earned degrees—the year granted and institution granting them, and, for the doctorate, the field of specialization. In 1956 a basic decision was reached to expand the information to be collected. Beginning with January 1957, each new entry has contained a whole IBM card-full of information, derived from a one-page questionnaire completed by each doctorate candidate as he approaches graduation. Age, sex, citizenship, marital status, number of dependents, birthplace, high school name and location, size of high school graduating class, type of high school, year of high school graduation—all these items of information are added to the basic degree data. Prospects for the individual's postdoctoral career are also investigated: location and category of employer, whether a postdoctoral fellowship has been awarded, whether the individual has a definite job commitment or is still seeking employment. Number of years of pre-doctoral employment is called for too, and scientific or professional societies of which the new doctorate-holder is a member, are listed. In prospect for 1961 and later are two additional items, regarding employment status in the year preceding the doctorate, and type of postdoctoral employment—whether primarily teaching, research, administration, or other. These latter two items are contemplated in order to provide information which the National Education Association has hitherto sought in a separate questionnaire to the graduate schools. It will be possible to eliminate the need for a separate questionnaire, and in addition to provide more data more promptly for the NEA's studies of the college teacher supply situation.

The motivation for adopting the questionnaire form in 1957 was, in the first instance, to provide a means of input of names into the Register of Scientific and Technical Personnel, maintained by the National Science Foundation. The opportunity to simultaneously gather data helpful in an-

swering a host of other questions about this important segment of the nation's high-level manpower was welcomed. The cooperation of the graduate schools has been most gratifying. The typical procedure is for the Dean of the Graduate School to gather the completed Doctorate Survey questionnaires from the doctorate-level graduates and to forward them to the Office of Scientific Personnel, where the questionnaires are coded and punched into IBM cards. The existence of this card file, and of the questionnaire file, which contains further data not punched into the card, has made possible a number of studies by several scholars unconnected with the NAS-NRC, as well as studies done intramurally by the OSP. Hardly a month goes by without some new and frequently unexpected request for data. A partial listing of these uses will illustrate the point.

The American Mathematical Society publishes in April of each year a list of all the mathematics Ph.D.'s of the previous year, from all United States Universities. Formerly obtained by special circularization of the universities, this list is now made up from the Doctorate Records file, and is available earlier with less effort for all concerned. Robert Knapp of Wesleyan University, author of *The Origins of American Scientists* and *The Younger American Scholar*, is currently engaged in a study of humanist scholars. Much of the basic data he is using came from a statistical analysis of OSP Doctorate Records. In his recent book, *Graduate Education in the United States*, Bernard Berelson relied heavily on this file as a basic data source. B. R. Seibring of the University of Wisconsin at Milwaukee has pursued the original question of baccalaureate origins, utilizing statistical tabulations of physicists, chemists, and bio-chemists from the OSP file. The National Institutes of Health have secured data on Ph.D.'s who also hold M.D. degrees, and has used the file also in a follow-up study of medical fellowship holders. Elbridge Sibley of the Social Science Research Council has consulted this file in a study of sociologists currently under way. The research group at the National Merit Scholarship Corporation, John Holland, Donald Thistlethwaite, and Alexander Astin have made use of the baccalaureate origins data in carefully controlled studies

of the effect of college environment in encouraging Ph.D. attainment.

Concern with scientific manpower problems has motivated most of the research undertaken by the OSP itself with respect to the Doctorate Records data. The question concerned acceleration of doctorate attainment associated with grant of a fellowship. The simplest and most accurate check on whether and when an individual had attained the doctorate degree was made by consulting the Doctorate Records files. In another study the National Science Foundation wanted to know, in 1959, a great deal more about the people attaining doctorate degrees in the several science fields. An elaborate statistical analysis resulted in a report entitled *The Science Doctorates of 1957 and 1958—Their Numbers, Backgrounds, and Employment*. The original supply of these reports was soon exhausted, as was a reprint order. A similar report prepared in 1960, *The Science Doctorates of 1958 and 1959*, was published as NSF Scientific Manpower Report 60-60, for which demand appears to have exceeded the printed supply of 2000 copies. The same basic fund of information meantime supplied the basis for two reports in *Science* on doctorate production in the sciences during the 1950's and on the relation of field of doctorate specialization to size of high school graduating class.

The recent renewed interest in the high school as a basic link in the education of scientists was the stimulus to two further studies of the high school backgrounds of the doctorates of 1957 and 1958. The first of these studies was initiated by Samuel Strauss, formerly of the D. C. Public School system, who had on his own investigated the high school records of the doctorate graduates of two nearby universities, and sought a more representative sample. The National Institutes of Health supported his study of the 1957 doctorate population, and the National Science Foundation furnished support for study of the 1958 doctorates, to be done intramurally by the OSP. With further analyses still to be done at this writing, the results have already proved to be of intense interest to students of scientific manpower problems. A few of these results are worthy of note here.

The intellectual requirements for the attainment of the doctorate have occasionally been subject to investigation and speculation. A study for the OSP by C. Gilbert Wrenn several years ago suggested that an I.Q. of 125 ought to be considered about the minimum intelligence level for Ph.D.'s while granting that in practice some persons below that level actually attain the degree. The OSP study taking the high school records alone, found that in fact an I.Q. of 125 is approximately the average level of intelligence for doctorates of all fields combined, but that at that level the relative rate of attainment is still not high—only about 12 persons per thousand at that level attain the doctorate. At I.Q. 140, which was taken arbitrarily as the lower bound for the "genius" category by Terman in his famous *Genetic Studies of Genius*, the rate rises to about 65 per thousand. At the highest level tabulated in the current study, those with high school I.Q.'s of about 160, the rate of doctorate attainment goes up to 190 per thousand—still less than one person in five.

Intelligence levels vary according to field of doctorate, physics, and mathematics registering the highest average intelligence levels—five to seven points above the mean of all doctorate-holders. When the doctorate holders are sorted by field and by intelligence level, and the relative doctorate productivity of each level computed, it is found that the physical and social sciences considerably exceed the total field productivity at the higher levels, with Arts and Humanities slightly above the general norm at the highest two levels. Bio-sciences and Education lag far below the general field at all intelligence levels from 130 up. Results of the same general nature are obtained when rank in high school graduating class rather than intelligence test score is considered. Some variation occurs here, in that the social sciences and arts groups do not differ markedly from the general all-field norm, while the physical sciences are consistently above the general level. Furthermore, there is a plateau effect when the higher ranks are concerned. Whereas, with IQ scores the general doctorate productivity rate shot far up at the highest level, doubling its rate over that of the next-to-highest level, the rates for the two highest levels of rank-in-

class are practically identical. The indication is that something unrelated to doctorate attainment is strongly rewarded at the top level of high school class rank.

Size of high school graduating class and region of high school may well be considered together, as they are related to a degree. The regions of highest doctorate productivity (about 50% above the United States norm) are those comprising the northeastern states, from Maine to Pennsylvania. The East-South-Central region, by contrast, produces high school graduates whose relative rate of doctorate attainment is less than half the national norm. Within the northeast group, the New York-New Jersey-Pennsylvania group is not nearly so outstanding as an area of origin of biologists as it is with respect to the other fields. The mountain states, in contrast, are about 50% above the national norm as a region of biologists, although unexceptional otherwise. These states, with their scattered populations, also tend to have more small schools. While size of high school graduating class is, in general, positively related to doctorate productivity, this relationship is not nearly so close in the case of biology as it is for the physical and social sciences. In the case of agriculture, there is an inverse relationship of productivity and class size: the smaller the class, the greater the rate of production of agricultural scientists. The dependence of this relationship on farm background seems quite clear-cut. A strong positive relationship is found between class size and productivity of social scientists. This seems logically to be an outcome of the more extensive social contacts and the existence of a greater degree of social conflict in the large population centers with their large schools. In the case of physical sciences, where the positive relation between class size and productivity is strongest, it seems probable that a quite different factor is involved. Provision of sufficient personnel and laboratory resources for adequate preparation for careers in the physical sciences is a much more difficult problem for the small schools than for the large ones.

From the over-all productivity rate, an interesting confirmation is obtained of James B. Conant's minimum desirable standard of 100 students per graduating class. Classes of 100 are just at the national norm in rela-

tive productivity, 84 doctorates per 100,000 graduates. Smaller classes produce fewer than 84, larger classes produce more than 84. The highest productivity rate, three times the national norm, is found for classes of 800 students or more.

Grades in mathematics and science courses, and number of math and science courses taken in high school, were also tabulated for each field of doctorate. To reduce the data to a manageable statistic, a grade-point average in math and science was computed for each student. Doctorate-holders of all fields tended to excel on this GPA scale, although field differences were very marked, and in the expected direction. A substantial number in all fields were "Straight A" students in math and science, although the modal GPA was "A-". At the highest GPA level, more than half the students were physical scientists; this percentage decreases sharply at the "B" and lower levels. The social scientists, in contrast, were relatively infrequent at the higher GPA levels, and very frequent at the "C" and "C-" levels, showing a rather clear-cut differential ability. This group was, it will be remembered, outstanding in general intelligence and in high school rank, but even in high school their talents apparently were directed strongly in the more verbal and social-science directions rather than toward the natural sciences. The bio-science group is found most frequently at about the "B" level in math-science GPA, being less frequent at either the higher or lower levels. The Arts and Humanities group is found with roughly the same frequency at "A," "B," and "C" levels, while those whose eventual field is Education are found most frequently at the "B-" to "C-" levels, and are the smallest group at the "A" level.

Examination of the data in more minute detail is going forward, with some indications that differences between even such closely related fields as mathematics and physics are discernable in the high school courses taken and grades obtained by members of these two groups. It is hoped that this data may throw light on some of the factors related to motivation for the various fields of science, and for other fields as well. To answer some of the questions raised by the data so far, it may be necessary to follow back the doctorate graduates of 1959

and 1960, investigating such additional data as grades in English, foreign languages, and social studies. Time trends in some of the high school data might then also begin to emerge. Such time trends cannot be very important in comparing any two adjacent years, however, as any single "doctorate crop" includes people who completed high school over a span of several years, on the average about 14 years before the granting of the doctorate degree.

Many other studies are possible with the data from the basic doctorate file, and some additional ones have already been projected. For example, the comprehensive nature of the doctorate records file makes it possible to compare the files of the National Register of Scientific and Technical Personnel with the Doctorate Records file, field-by-field, to

determine the coverage of the various fields in the Register. Future use of the Doctorate Records can only be surmised on the basis of past experience. Suggestions have been made that it should be the basis for a long-term study of highly trained manpower in all fields—not the sciences alone—to determine the utilization which society makes of those people trained to the doctorate level. Because of the long time-span covered by this file (soon to cover a period of over 40 years) time trends by field, in doctorate production, baccalaureate origins, and BA-to-PhD time lag are quite feasible, without going beyond the data already on IBM cards. Extensions of data, working from this file as a solid base, may offer some of the best hope for insightful studies in the supply-and-demand field.

SCIENCE NEWS

STUDY OF NATURAL RESOURCES

In his special message to Congress on Natural Resources, President Kennedy indicated his intention of asking the National Academy of Sciences-National Research Council "to undertake a thorough and broadly based study and evaluation of the present state of research underlying the conservation, development and use of natural resources, how they are formed, replenished and may be substituted for, and giving particular attention to needs for basic research and to projects that will provide a better basis for natural resources planning and policy formulation."

The President's request has been accepted by Detlev W. Bronk, President of the National Academy of Sciences-National Research Council and plans are now going forward for an intensive study which will involve many of the divisions and activities of the Academy-Research Council.

Cooperation with the Federal government will be effected through a special committee of The Federal Council for Science and Technology. John S. Coleman, Executive Secretary, Division of Physical Sciences is serving as staff coordinator for the NAS-NRC.

RUSSIAN-ENGLISH DICTIONARY

The American Mathematical Society will publish, late this summer, a *Russian-English Dictionary of Mathematical Terms* compiled by A. J. Lohwater, with the collaboration of S. H. Gould. The compilation was under the auspices of the American Mathematical Society, the National Academy of Sciences, and the Academy of Sciences of the USSR. At the same time, the Academy of Sciences of the USSR will publish an *English-Russian Dictionary of Mathematical Terms* essentially identical in size and character.

Following an exchange of letters between Detlev W. Bronk, President of the National Academy of Sciences and A. N. Nesmeyanov, President of the Soviet Academy of Sciences, committees of mathematicians were appointed to represent the two academies. The Soviet committee consisted of P. S. Alexandrov, *chairman*, I. R. Shafarievich, M. M. Postnikov, A. F. Leontiev, and A. A. Dezin, and the American committee consisted of S. H. Gould, A. J. Lohwater, and G. I. Rainich. Later the Soviet committee was augmented by the appointment of L. N. Bolshiev, S. M. Nikolskii, E. D. Solomentsev, and L. D. Kudryavtsev, who acted as executive vice-chairman.

BUILDING RESEARCH INSTITUTE SPRING MEETING

Major technical programs on adhesives and sealants, plastics, public entrance doors, and new building research will be featured at the 1961 Spring Conferences of the Building Research Institute (BRI), May 16-18.

At a luncheon on May 17, Edmund Purves, recently retired Executive Director, American Institute of Architects, will receive the second presentation of the F. Stuart Fitzpatrick Memorial Award. Selection of the recipient is made by a committee which includes representatives of the Building Research Institute, the National Association of Home Builders, the Producers' Council, the American Institute of Architects, and the Associated General Contractors of America.

George J. Schulte, Minnesota Mining & Manufacturing Co., is chairman of the BRI planning committee developing a comprehensive program in three parts on adhesives and sealants. Leslie M. Jackson, The Tremco Mfg. Company, will be the session chairman on Requirements for Weatherproofing Thin Shell Concrete Roofs, which will include reports on weatherproofing and sealant materials, the effect of physical factors, properties, and uses of available materials.

Richard G. Breeden, Jr., Pressure Sensitive Tape Council, will head the session on Pressure Sensitive Tapes for Buildings, which will discuss recent field history of tapes for sealing applications and their use in the building industry.

The third session, Selection and Field Application of Adhesives, will be chaired by D. Kenneth Sargent, School of Architecture, Syracuse University. Several important papers will be presented on adhesives for ceramic, plastic and metal tile, wallboard, resilient floor coverings, insulation, plastic laminates, acoustical tile, and new field applications.

The Conference on Public Entrance Doors, under the direction of William Haswell, National Builders Hardware Association, will embrace the following aspects: safety and security, installation and operation, weather protection, maintenance factors, and coordination of hardware.

INDIAN OCEAN EXPEDITION

The International Indian Ocean Expedition, sponsored by the International Council of Scientific Unions' Special Committee on Oceanic Research and by UNESCO, is taking definite shape. With investigations scheduled throughout the period 1960-1964, ten reconnaissance cruises have already been completed. Virtually every nation and colony around and in the Indian Ocean has indicated, at least unofficially, that it will participate. Seven additional countries outside of the Indian Ocean area will make substantial studies with their own ships and scientists, and other countries will provide scientific parties.

Levels of participation fall into three categories: nations providing ships and scientific parties, countries and colonies bordering on the Indian Ocean which will participate through making observations on tidal changes and upper atmosphere meteorological phenomena, and nations providing scientific parties without ships.

The scientific effort is designed to obtain a better understanding of the entire "heat engine" which is the Indian Ocean and its atmosphere together with its boundaries. Thus, studies will be conducted in the fields of marine geology, geophysics, and bathymetry; physical and chemical oceanography; biological oceanography; and meteorology from the air-sea interface to the upper atmosphere. Several hundred scientists in these disciplines throughout the world are already engaged in planning for future cruises and in analysis of past investigations. In the United States, for example, 31 scientists in five Working Groups have drawn up a substantial national plan in consultation with many more specialists in various marine research laboratories. Over one hundred American biologists have thus far expressed an interest in some type of participation.

The Expedition's findings will be presented in atlas form together with collected volumes of individual scientific papers. Further important outcomes are the development of a body of trained scientists and technicians within the Indian Ocean area to continue oceanographic research; the development of existing and new institutions in this region, including a biological classi-

fication center and reference collection, and presumably the beginning of a better understanding about some of the natural factors which affect the existence of that quarter of the world's population living in the countries bordering on the Indian Ocean.

ADVISORY COMMITTEE ON CIVIL DEFENSE

Two new subcommittees have been established during January 1961, in response to requests for advice from the Office of Civil and Defense mobilization (OCDM).

The Working Group on the Assessment of Damage to Livestock from Radio-active Fallout has as its main purpose the preparation of recommendations to improve procedures for use with the computer at OCDM's National Resources Evaluation Center. These are the procedures for estimating the post-attack availability of livestock as a source of food. John Rust, University of Chicago, is chairman of the group.

The Working Group on Fallout Model for Attack Damage Assessment also was formed primarily to assist the OCDM in its damage assessment mission. The group is, therefore, preparing recommendations on how to improve the fallout model used with the computer, as well as to advise on research on fallout patterns. Harold Knapp, Atomic Energy Commission, is chairman.

These new subcommittees, along with the Subcommittee on Radiation Shielding and the Working Group on Citizens' Instruments, bring to four the number of groups now active on specific civil defense problems. In addition, a group is in the process of being formed to study and advise on the ecological problems that might occur in the aftermath of nuclear attack. Lastly, consideration is being given, in coordination with the Committee on Fire Research, to establishing a group to examine the fire spread phenomena.

The Advisory Committee has recently published the *Proceedings of the Meeting on Environmental Engineering in Protective Shelters*. The meeting was jointly sponsored by the Advisory Committee on Civil Defense, the National Bureau of

Standards, and the Office of Civil and Defense Mobilization in February 1961.

LOUIS S. B. LEAKEY LECTURE AT ACADEMY

On February 27, 1961, Louis S. B. Leakey, Director of the Coryndon Museum, Nairobi, Kenya, addressed the National Academy of Sciences in Washington on the subject of his newest findings relating to early man, at the remarkable stratified Middle Pleistocene site in Olduvai Gorge, Tanganyika. Here the gorge has cross-sectioned some 300 feet of deposits, mostly lacustrine, which can be divided into five distinct Beds, representing as many periods.

Dr. Leakey reviewed first his discovery of *Zinjanthropus boisei* in 1959. These remains in Bed I, consisted of the nearly complete skull of an individual about 18 years of age. Later in the same level, a tibia and a fibula were found. All of the bones were free from distortion.

Of great interest is the fact that these bones were lying on the actual living floor of an ancient lakeside camp site, which was littered with stone tools, reject flakes, and the fossil bones of fish, reptiles, amphibians, and many crushed bones of the juveniles of large mammals and giant ostrich. This suggests that the food supply of *Zinjanthropus* consisted of animals that could be captured without the aid of manufactured weapons.

Dr. Leakey places *Zinjanthropus* in the subfamily *Australopithecinae*, which contains the two well known South African forms *Australopithecus* and *Paranthropus*. However, he pointed out a long list of items in which it differs from *Paranthropus*, the form most closely resembling it. These differences for the most part indicate development in the direction of modern man. Since *Zinjanthropus* appeared to be the first hominid to have manufactured stone tools according to a definite pattern, it was thought to be the earliest true human.

Following this summary, Dr. Leakey made the first public announcement of new hominid remains found during 1960 and 1961 as a result of the acceleration of his work at Olduvai because of adequate financial support from the National Geographic Society.

UNESCO, EIGHTH NATIONAL CONFERENCE

The United States National Commission for UNESCO will hold its Eighth National Conference on the theme "Africa and the United States: Images and Realities" in Boston, Massachusetts, October 22-26, 1961. The Commission is inviting a number of American and African leaders in education, science, and culture to the Conference. The major objectives of the Conference are to broaden and deepen American understanding of the achievements and aspirations of Africa's peoples, and to develop ideas the National Commission can pursue in advising the United States Government on educational, scientific, and cultural aspects of American policy in Africa and UNESCO.

One of the 12 panels which will meet during the course of this conference will be entitled "Science: Training and Research". Such broad topics as: Science in Africa; The Image of United States Science and Technology in Africa; and International Cooperation in Scientific Research, are to be discussed by a group of African and American scientists acting as panelists.

John J. McKelvey, Jr., Associate Director of Agricultural Sciences at the Rockefeller Foundation, is serving as Chairman of the Conference's "Science: Training and Research" panel with Eric R. Rude, Professional Associate, Office of International Relations, National Academy of Sciences-National Research Council, acting as rapporteur.

ANNUAL MEETING OF THE DIVISION OF BIOLOGY AND AGRICULTURE

The annual meeting of the Division of Biology and Agriculture was held March 10 and attended by the members and staff of the Division and a few invited guests. By request of the members, the meeting featured a small symposium on Pest Control and Wildlife Relationships, a subject currently being studied by a committee of the Division. The symposium did not constitute a report of the committee, but rather

the personal views of the four speakers on the subjects assigned to them:

Relationships in Agriculture, George C. Decker, Director of State Natural History Survey Division, Illinois

In Forestry, Tom H. Gill, Executive Director Charles Lathrop Pack Forestry Foundation

In Public Health, S. W. Simmons, Public Health Communicable Health Center, Atlanta, Georgia

In Wildlife Management, Ira N. Gabrielson, President, Wildlife Management Institute

Particular attention was given to a proposed International Biological Program, which had already been approved in principle by the International Union of Biological Sciences (IUBS) and by the International Council of Scientific Unions (ICSU). Paul Weiss, chairman of the United States National Committee of the IUBS, pointed out that no specific program had yet been approved by ICSU, but that agreement had been reached on the characteristics of an acceptable program.

GEOPHYSICS RESEARCH BOARD

The Geophysics Research Board was established in 1960 by Detlev W. Bronk, President of the National Academy of Sciences-National Research Council, in concert with the Governing Board of the Academy. This was partly in response to a request from the International Council of Scientific Unions (which has called upon all Academies to establish a means for their cooperation with its International Geophysics Committee [C.I.G.]), and partly in response to expressions of interest by many members of the geophysical community. The American Geophysical Union, for example, strongly urged that the Board be established and pledged its cooperation and assistance.

Discussions, during the past year, involving many geologists and geophysicists, have led President Bronk to define the basic functions of the Board as follows:

(1) to effect participation by American scientists in the new International Committee on Geophysics of the International Council of Scientific Unions; and

(2) to stimulate and encourage research interest in the United States in geophysics and related fields, particularly those of an interdisciplinary character.

Membership of the Board consists largely of the chairmen or representatives of existing committees within the Academy; this will serve not only to bring together the geophysical interests of the Academy but also to minimize the burdens on the Board itself. These individuals and their committee activities are as follows:

Merle A. Tuve, Carnegie Institution of Washington, Chairman

L. V. Berkner, Space Science Board

Henry G. Booker, United States National Committee—International Scientific Radio Union

Harrison S. Brown, Committee on Oceanography

Michael Ference, Jr., Committee on Atmospheric Sciences

Laurence M. Gould, Committee on Polar Research

Joseph Kaplan, United States National Committee—International Geophysical Year

Martin A. Pomerantz, United States National Committee—International Union of Pure and Applied Physics

Francis W. Reichelderfer, United States Weather Bureau

Walter O. Roberts, United States National Committee—International Astronomical Union

George P. Woollard, United States National Committee—International Union of Geodesy and Geophysics and American Geophysical Union.

The Board has approved the establishment of the following four panels to deal with problems immediately before it:

World Magnetic Survey, E. H. Vestine, Chairman; Interchange of geophysical data. A. H. Shapley, Chairman; Proposed sunspot minimum program (now called the International Year of the Quiet Sun and scheduled for 1964-65), M. A. Pomerantz, Chairman; The solid earth, consisting of two working groups under the chairmanship of G. P. Woollard and H. A. Yoder, Jr.

In each of the above areas the Board has before it international proposals stemming from the C.I.G. and is called upon to examine the nature and prospects of American contributions to these worldwide efforts. In addition, the Panel concerned with the solid earth will discuss opportunities to advance the knowledge of our planet on a long term basis. These panels are scheduled to meet in April to initiate their work. A short meeting of the Board is scheduled during the time of the Academy's Annual Meeting to discuss a few problems in preparation for a full meeting later in the year.

DIVISION OF MATHEMATICS ANNUAL MEETING

The annual meeting of the Division of Mathematics was held on Friday, March 10, with 34 members and guests in attendance. The major business of the afternoon session was a discussion of current Division activities led by the Chairman, J. Barkley Rosser, Cornell University.

The Division recommended that the Institute of Management Sciences, which desires to associate with the Division, be invited to nominate a representative, thus joining the ten societies currently cooperating with the Division.

The Division also recommended that the National Aeronautics and Space Administration and the Department of Health, Education and Welfare be invited to nominate liaison representatives to the Division.

In June 1960 an ad hoc committee was established in the Division of Mathematics to make a survey of the current and potential contributions of the mathematical sciences to the solutions of various problems in space science and to make recommendations to the Space Science Board. Harry Pollard, of the Department of Mathematics at Cornell University, who spent the past year visiting laboratories, universities, firms, and other groups throughout the United States looking into this question, reported on his findings. The Division recommended that the Chairman actively pursue means to improve communications in the area of mathematics in space science.

Plans are going forward to provide assistance to mathematicians to attend the Twelfth International Congress of Mathematicians to be held in Stockholm, Sweden, August 15-22, 1962. The Division's Committee on Travel Grants is providing opportunity for mathematicians, especially younger people, to file applications by November 1, 1961.

At the evening session of the annual meeting, E. E. Moise, Harvard University, G. B. Price, Conference Board of the Mathematical Sciences, J. B. Rosser, Cornell University, and A. W. Tucker, Princeton University, led a discussion on trends in graduate mathematical education.

CONFERENCE ON MARINE FOOD RESOURCES

The Food and Nutrition Board is collaborating with the Department of the Interior and the National Institutes of Health in arrangements for the Food and Agriculture Organization's International Conference on Fish in Nutrition to be held in Washington, D. C. in September 1961.

The official delegates of 81 nations meeting in Rome, Italy, during the Tenth Conference of the Food and Agriculture Organization (FAO) of the United Nations, directed FAO to schedule an international conference on the nutritional value of fishery products. The directive was based on the delegates' appreciation of a need for organizing and increasing research on the possible nutritional contributions of fish and shellfish. Such research would have the end result of increasing the world's production and consumption of marine products and would materially alleviate the pressing world problem of protein malnutrition. The delegates agreed that marine products represent the last major and relatively unexploited source of animal protein.

The formal Conference will be a scientific meeting lasting for a total of six or seven days. Topics presented will neither be of an extremely technical nor of an overly applied nature but such as to insure optimum utilization of information by domestic and foreign fisheries scientists and industry personnel. There will be submitted comprehensive and authoritative reviews of assigned topics and oral summaries of these reviews. Original research papers also will be presented.

United States agencies participating in the Conference include the Food and Nutrition Board, National Academy of Sciences-National Research Council, the Departments of State and Interior, the National Institutes of Health, and a Scientific Advisory Committee composed of United States scientists in the fields of animal and human nutrition, and food and fishery technology.

Those nominated to serve on the United States Scientific Advisory Committee for the FAO Conference on Marine Food Resources in World Nutrition are:

- 1) Representing the Food and Nutrition Board, National Academy of Sciences-National Research Council—
David B. Hand, New York State Agricultural Experiment Station
Les J. Tepley, Children's Fund, United Nations
LeRoy Voris, Food and Nutrition Board, NAS-NRC
- 2) Representing the Nutrition Study Section, National Institutes of Health—
Grace A. Goldsmith, School of Medicine, Tulane University
D. Mark Hegsted, Harvard School of Public Health
J. A. Uram, National Institutes of Health
- 3) Representing the Interdepartmental Committee on Nutrition for National Defense—
A. E. Schaefer, National Institutes of Health
- 4) Representing the Bureau of Commercial Fisheries, Department of the Interior—
Jack Holston, U. S. Department of the Interior, *chairman*
Donald Snyder, U. S. Department of the Interior

COMMITTEE ON INTERNATIONAL SCIENTIFIC UNIONS

The Committee on International Scientific Unions, under the chairmanship of W. Albert Noyes, Jr., met at the Academy-Research Council on April 13. This Committee consists of the chairmen of the United States National Committees for each of the individual scientific Unions composing the ICSU and serves as the United States National Committee for ICSU itself.

Most of the deliberations of the Committee were concerned with the future structure of ICSU. Recognizing the rapid growth of international scientific activity, ICSU has undertaken, along with its adhering members, a re-examination of its role in world science. Lively discussions led to several recommendations designed to strengthen the ICSU and to enable it in the future to be of even greater service to the advancement of science throughout the world. The committee proposed several specific means to broaden the global character of ICSU, to provide it with adequate administrative and financial support, and to enable ICSU to assume greater initiative and leadership in international scientific efforts. These tentative recommendations have been conveyed to the Secretary General of ICSU.

The Committee also examined other questions which are expected to arise at the Ninth General Assembly of ICSU to be held in London, England, September 25-28, 1961.

INTERNATIONAL CONGRESS OF MATHEMATICIANS

Travel grants will be made to a number of mathematicians who wish to attend the International Congress of Mathematicians in Stockholm, on August 15-22, 1962. It is hoped that funds available through various sources may provide travel assistance for a considerable number of mathematicians.

There will be a greater effort than in the past to give aid to younger people. As grants will be made only to those who have filed applications, it is urgent that any who wish to receive a grant should fill out and file an application. Applications can be obtained from the Division of Mathematics, National Academy of Science-National Research Council.

Awarding of grants will be made only to those persons whose applications have been received, in good order, by November 1, 1961. An attempt will be made to announce the grants by January 1, 1962.

COMMITTEE ON FIRE RESEARCH

A four weeks' study on problems of uncontrolled fire will be conducted at Woods Hole by the Committee on Fire Research of the National Academy of Sciences-National Research Council, from July 17 to August 11, 1961. H. C. Hottel, Director of the Fuels Research Laboratory, Massachusetts Institute of Technology, is the present chairman of the Committee. The summer study will be directed toward a better understanding of the scientific phenomena associated with uncontrolled fires. This will be a concentrated study by a carefully selected group in an effort to achieve more effective control or prevention of urban, forest, and industrial conflagrations of large size. Federal agencies concerned with various aspects of the problem concur in the study.

TROPICAL MEDICINE SURVEY

The second meeting of the Advisory Committee on Tropical Medicine was held at the Academy-Research Council on March 24 with Albert B. Sabin, University of Cincinnati, Chairman of the Committee, presiding.

Stacy May, Rockefeller Office, discussed methods for evaluating the economic impact of disease in the tropics. The subject was approached from three points of view: the importance of *tropical* areas to the United States, the economic cost of ill health in tropical areas, and the dimension of financial and personnel increases needed to attain realistic goals in health improvement.

Justin M. Andrews, National Institute of Allergy and Infectious Diseases, reported on the new international centers for medical research and training being developed by the National Institute of Allergy and Infectious Diseases for the National Institutes of Health. This activity partially implements the provisions of the International Health Research Act of 1960. Four universities, California, Tulane, Johns Hopkins, and Maryland, have been awarded International Center for Medical Research and Training (ICMRT) grants to permit establishment of teaching and research programs in collaboration with schools of medicine in tropical countries.

William W. Frye, Louisiana State University School of Medicine, presented the results of a survey of the status of tropical medicine research in the medical schools of the United States and Canada.

A progress report on the status of the Survey of Resources and Needs in Tropical Medicine was presented by Willard H. Wright, NAS-NRC Director of the Survey, and Curt R. Schneider, Professional Associate, Tropical Medicine Survey.

The membership of the Advisory Committee on Tropical Medicine is as follows:

Albert B. Sabin, University of Cincinnati, *Chairman*
James A. Doull, Leonard Wood Memorial
Wilber G. Downs, Trinidad Regional Virus Laboratory
William W. Frye, Louisiana State University
W. A. Hagan, U. S. Department of Agriculture
Carl M. Johnson, Gorgas Memorial Laboratory

Stacy May, Rockefeller Office
Oliver R. McCoy, China Medical Board of New York, Inc.

Paul F. Russell, Harvard School of Public Health
George M. Saunders, Socony Mobil Oil Co., Inc.
Max Tishler, Merck, Sharp and Dohme Research Laboratories

Thomas H. Weller, Harvard School of Public Health

In addition 28 liaison representatives and guests attended the meeting.

The final report of the Survey will be published by the Academy-Research Council.

THE FULBRIGHT PROGRAM IN ASIA

Francis A. Young, Executive Secretary of the Committee on International Exchange of Persons, returned on March 9 from a seven-week trip to Asia to consult with agencies and individuals connected with the Fulbright Educational Exchange Program. The countries covered in Dr. Young's itinerary were Japan, Korea, China (Taiwan), Philippines, Thailand, Burma, India, Pakistan, Ceylon, and Iran.

The purposes of Dr. Young's trip were to assess the progress of the Asian exchange programs, especially those with the underdeveloped countries; to meet with senior Fulbright grantees in Asia in order to gain a better understanding of the conditions under which they work; to identify the major problems encountered in the exchange program abroad and to discuss possible solutions; and to form some judgment of the extent to which, assuming the availability of funds, the size of the programs in Asia might profitably be increased.

In education as well as in other respects, each country of Asia differs from its neighbor, and generalizations are difficult to make. There is, however, one basic observation which can be made with respect to education in the free nations of Asia. In all the countries of Asia there is a deep and growing faith in the power of education to overcome ignorance, hunger, and disease and to promote economic and social growth. This faith is largely responsible for the high prestige which programs of educational and cultural exchange enjoy in

Asia. This faith has also placed the educational systems of these countries under severe strains in trying to meet the steadily rising demand of the masses for greater educational opportunity at all levels. It is extremely doubtful whether these demands can be met without increased assistance from the United States and other countries, especially in the development of new fields of teaching and research in institutions of higher education.

NATIONAL SCIENCE FOUNDATION FELLOWSHIPS

For the tenth year the Fellowship Office of the National Academy of Sciences-National Research Council has assisted the National Science Foundation by receiving and evaluating NSF applications for graduate and postdoctoral fellowships.

This year, 465 applications for regular postdoctoral fellowships were reviewed by fellowship evaluation committees selected by the Academy-Research Council. The Postdoctoral Evaluation Board met on January 29 to make final evaluations and on March 15, awards were announced by the National Science Foundation.

Also reviewed by the evaluation committees were 151 applications for the North Atlantic Treaty Organization (NATO) fellowship program and 45 applications for the European Economic Cooperation Senior Visiting Fellowship program (OEEC). Forty-four NATO and 19 OEEC awards were announced by the National Science Foundation early in April.

In the graduate fellowship program 4874 applications were evaluated by eight NAS-NRC panels which met at the Academy-Research Council building February 20-24. From these applications, 1537 graduate fellowships were awarded, 591 of which were renewals. Of these awards, 347 were made in the life sciences, 1156 in the physical sciences, and 34 in certain areas of the social sciences.

The Fellowship Office again assisted in the evaluation of two other NSF graduate fellowship programs inaugurated in 1959—the Cooperative Graduate Fellowships and Summer Fellowships for Graduate Teach-

ing Assistants. During the week of February 13-17, ten NAS-NRC panels reviewed 3241 applications for Cooperative Graduate Fellowships and 1366 applications for Summer Fellowships for Graduate Teaching Assistants. A total of 1100 Cooperative Fellowships were awarded, 186 in the life sciences, 882 in the physical sciences, and

32 in certain areas of the social sciences. In the Summer Fellowships for Graduate Teaching Assistants program, a total of 625 awards were made, 175 in the life sciences, 423 in the physical sciences, and 27 in certain areas of the social sciences. These awards are announced by participating institutions.

RECORD OF MEETINGS

January

- 4 Subcommittee on Nutrition Documentation
- 5 Subcommittee on Thermal Factors in Environment
- 6 Committee on Paper Base Materials, *Natick, Mass.*
Committee on Prosthetics Research and Development
United States National Committee for FID; Office of Documentation
- 9 Committee on Inter-American Scientific Cooperation
Soil Compaction Criteria Committee
Task Group T-46, Continuous Operated Diesel Generators
- 9-10 Working Group on Livestock Damage
- 9-13 Highway Research Board Annual Meeting
- 10 Working Group on Physiological and Psychological Testing
- 12 Ad Hoc Committee on Nonmilitary Defense
- 12 Advisory Committee to the Coast and Geodetic Survey
- 12-13 Working Group on Fallout Models for Attack Damage Assessment
- 13 Planning Committee for the Desalination Research Study
Advisory Committee on Africa South of the Sahara
Highway Research Board, Executive Committee

January

- 13 Planning Meeting for Cold Storage Research Study
- 13-14 Subcommittee on Child Prosthetics Problems
- 14 National Advisory Committee, AASHO Road Test
Association of American Geographers, Middle Atlantic Division
- 16 Committee on Cross-Disciplinary Studies, Office of Scientific Personnel
- 16-17 Committee on Drug Addiction and Narcotics, *New York*
- 17 Toledo Study Committee
Committee on Economics of Graduate Training
- 18 Committee on Ship Steel, Advisory Committee for SR-136
American Meteorological Society
- 19 Working Group 10 (Visual Standards) of Committee on Vision
Building Research Advisory Board, T-45 Boilers
Committee on Anesthesia, *San Francisco, California*
- 20 Food Protection Committee and the Industry Committee, *New Orleans, La.*
- 21 Committee on Prosthetics Research and Development, Steering Committee for annual Spring Conference
Pacific Science Board
- 23 Building Research Advisory Board, Task Group T-35 on Piling

January

- 24 Committee on Travel Grants, Division of Mathematics
Committee on Sanitary Engineering and Environment
- 24-25 Committee on Control of Deterioration
Naval Research Advisory Committee
- 25 Committee on Ship Structural Design, Advisory Committee for SR-149
Executive Committee of Division of Mathematics
Committee on Textile Fabrics, New York Group on Design Problems
- 26 Committee on Ship Structural Design Advisory Committee for SR-155
- 26-27 National Science Foundation, Fellowship Screening Board
Division of Physical Sciences, Postdoctoral Committee
- 27 Informal Planning Meeting for Refrigerated Storage Insulation Research
Committees on Postdoctoral Fellowships, Division of Earth Sciences
- 27-28 Ad Hoc Committee on Below-Knee Problems
- 29 Office of Critical Tables, Executive Committee
- 30 Committee on Pathology
Data Analysis Panel, AASHO Road Test, *Chicago, Ill.*
- 31 International Intersociety Committee on Pathology

February

- 1-2 Seminar on Higher Education in the Americas
- 3 Committee on Atmospheric Sciences
Subcommittee on Transfusion Problems
- 4 Committee on Blood and Related Problems
Screening Committee for Travel Grants to the International Congress of Biophysics
- 6 Building Research Advisory Board, Task Group T-35, Piling
- 7 Subcommittee on Pest Control Manual
- 8 Scientific Advisory Committee, The Given Foundation
Building Research Institute Programs Steering Committee
Building Operation and Maintenance Study Group

February

- 9 Building Research Institute, Programs Committee
Building Research Institute, Operation and Maintenance Study Group
Committee on Fruit and Vegetable Products, *Chicago, Ill.*
Division of Medical Science, Executive Committee
Building Research Institute, Programs Committee
- 9-10 Working Group on Fallout Models for Attack Damage Assessment
- 10 Coordinating Representatives for Mathematics
Building Research Institute, Committee on Usage of Doors
Committee on the Cardiovascular System
- 11 Division of Earth Sciences, Executive Committee
Advisory Committee on Scientific Exchanges with the Soviet Union
- 12 Governing Board, National Academy of Sciences-National Research Council
- 13 Photographic Scientists and Engineers
Committee on International Scientific Unions
- 14-16 National Science Foundation, Co-operative Graduate Fellowship Panels
- 15 Committee on Veterans Medical Problems
- 16-17 Working Group 6 (Visual Displays) of Committee on Vision, *Rome, N.Y.*
- 17 Subcommittee on Atmospheric Industrial Hygiene
- 19 Committee on Toxicology
- 20 Committee on Ship Steel, Advisory Committee for SR-139
Committee for the Preservation of Indigenous Strains of Sorghum
- 21-23 National Science Foundation Graduate Fellowship Panels in Chemistry
- 23 Committee on Ship Steel, Advisory Committee for SR-151, *New York, New York*
- 24-26 Committee on Oceanography, *La Jolla, California*
- 24-25 Committee on Radiology
- 27 Committee on Science in UNESCO
- 28 Committee on Ultra-Violet Light Study
Institute of Aero-Space Sciences
Port Study Committee, Maritime Cargo Transportation Committee

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- IGY World Data Center A. *Rockets and Satellites. IGY Satellite Ionospheric Research Based on Observations of 1957 Alpha and 1958 Delta.* Washington, NAS-NRC, 1960. (IGY Satellite Report No. 12.) 78 p. \$1.00.
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- International Union of Theoretical and Applied Mechanics. *Magneto-Fluid Dynamics; Proceedings of a Symposium Sponsored by the International Union of Theoretical and Applied Mechanics in Cooperation with the National Academy of Sciences-National Research Council . . . January 1960. Edited by F. N. Frenkiel and W. R. Sears.* New York, American Physical Society, 1960. (NAS-NRC Publication 829. Published simultaneously in *Reviews of Modern Physics*, Vol. 32, No. 4, Oct. 1960.) [340] p., illus. \$4.00.
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- Leddicotte, G. W. *The Radiochemistry of Manganese.* Washington, NAS-NRC, Committee on Nuclear Science, Subcommittee on Radiochemistry, 1960. (Nuclear Science Series; Report No. [30-18]) 22 p. \$0.50. (Available from: Office of Technical Services, Dept. of Commerce, Washington 25, D. C.)
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- National Council of Teachers of Mathematics. *Careers in Mathematics.* Washington, National Council of Teachers of Mathematics [and] National Academy of Sciences-National Research Council, 1961. 28 p. \$0.25.
- National Research Council. Ad Hoc Committee on Fluid-Controlled Legs. *Final Summary Report, Henschke-Mauch "Hydraulik" System, Model B (Swingphase Control) for Above-Knee Prosthesis.* Washington, NAS-NRC, Committee on Prosthetics Research and Development, 1960. 14 p.
- National Research Council. Building Research Institute. *Adhesives in Building. Lamination of Structural Timber Beams, Bonding of Cementitious Materials, Bonding of Gypsum Drywall Construction.* Washington, 1960. (NAS-NRC Publication 830.) 106 p., illus. \$5.00.
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Notice of Academy Meetings

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL
Governing Board, Washington, D. C., June 11, 1961

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*The search for Truth is in one way hard
and in another easy. For it is evident that no one
can master it fully nor miss it wholly. But each adds
a little to our knowledge of Nature, and from all
the facts assembled there arises a certain grandeur.*

—ARISTOTLE

